PROCEEDINGS

OF THE

CALIFORNIA ACADEMY OF SCIENCES

FOURTH SERIES

Vol. XLI, No. 7, pp. 233–251; 11 figs.; 5 tables August 18, 1977

A NEW GENUS (*MESOBIUS*), AND THREE NEW BATHYPELAGIC SPECIES OF MACROURIDAE (PISCES, GADIFORMES) FROM THE PACIFIC OCEAN

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Abstract: A new genus, *Mesobius*, and three new species (*M. berryi, M. antipodum, Nezumia parini*) of bathypelagic macrourid fishes are described from the Pacific Ocean. *M. berryi* is known from the eastern North Pacific, *M. antipodum* from a single adult off New Zealand, and *N. parini* from the equatorial eastern Pacific and midwaters between Panama and northern Chile. *M. berryi* passes through a phalacromacrurus stage characterized in early prejuveniles by bold spotting on the head and body, stylopterus pectorals, and almost vertical jaws. Later prejuveniles have normal pectorals and more nearly horizontal mouths. Spots remain on the trunk and tail in individuals as large as 40 mm in head length, but the general blackish color characteristic of all bathypelagic macrourids obtains in older individuals. The small jaw teeth in narrow bands, the uniquely elongated and aligned head scales, and the seven branchiostegal rays of *Mesobius* contrast with the fanglike teeth in single series, the circular head scales, and the six branchiostegal rays of two other bathypelagic macrourids, *Odontomacrurus murrayi* and *Cynomacrurus piriei*. It appears to be most closely related to the monotypic genus *Echinomacrurus*. *Nezumia parini*, the only known bathypelagic member of an otherwise exclusively benthopelagic genus, retains many of the characters of its benthopelagic relatives, but it has the reduced musculature, skeleton, gill-filaments and gas-bladder of other bathypelagic macrourids. Its small scales are distinctively covered with very fine, erect spinules, that yield a velvety texture to body surface.

Introduction

Most of the 250 or so species of the deepsea fish family Macrouridae are benthopelagic as adults. These benthopelagic species generally hover and glide over the bottom at an inclined, nose-downward attitude while seeking out their bottom-dwelling or near-bottom prey. Those that have become restricted to feeding on food items buried within the bottom substratum tend to have a small, protrusible, inferior mouth and a strongly reinforced spade-shaped rostrum that aids in rooting out prey. The more generalized feeders tend to have a larger, more terminal mouth. Many of those that feed on fish, cephalopods, and swimming crustaceans are known to seek their prey well off bottom. Examination of stomach contents of the abyssal species *Coryphaenoides armatus* Hector, 1875, *C. leptolepis* Günther, 1877, and *C. filifer* (Gilbert, 1895) has revealed a high proportion of

pelagic food items in their diet (Pearcy and Ambler 1974; Haedrich and Henderson 1974). Dense aggregations of *Coryphaenoides rupestris* (Gunner, 1765) are known to rise regularly to 100–300 m off bottom in the western North Atlantic (Pechenik and Troyanovskii 1970; Haedrich 1974). *Coryphaenoides acrolepis* (Bean, 1884), a species of the North Pacific, though primarily benthopelagic, has also been reported captured thousands of meters above bottom (Rass 1963:221; Makushok 1967:201; Iwamoto and Stein 1974:16). The bizarre, globose-headed species *Squalogadus modificatus* Gilbert and Hubbs, 1916, *Macrouroides inflaticeps* Smith and Radcliffe, 1912, and *Echinomacrurus mollis* Roule, 1916, are probably primarily bathypelagic, but they have been taken most often in bottom trawls.

Most species of macrourids probably dwell at bathypelagic or mesopelagic depths as larvae or juveniles (Marshall 1965). A few species have adopted, as adults, an exclusively pelagic habit in the deep midwaters of the oceans. When he reviewed the bathypelagic macrourid fishes, Marshall (1964) considered only two species, *Odontomacrurus murrayi* Norman, 1939, and *Cynomacrurus piriei* Dollo, 1909, as being strictly confined to the midwaters of the ocean, although he suspected (and later, with Tåning (1966), gave evidence) that *Macrouroides inflaticeps* Smith and Radcliffe and *Squalogadus modificatus* Gilbert and Hubbs were probably primarily bathypelagic. *O. murrayi* is known mostly from the eastern Atlantic, although the holotype was taken in the Indian Ocean. *C. piriei* is known only from waters inside the Antarctic Convergence, where it abounds.

In the present paper, we describe three new species of bathypelagic macrourids, all from the Pacific. Two are clearly referable to a trenchantly distinct new genus, *Mesobius*. The third is referred to *Nezumia*, a genus of numerous, almost exclusively benthopelagic, species. The three new species are known only from captures made in midwater nets fished far off the bottom.

Methods

Methods for taking measurements and counts generally follow procedures outlined by Hubbs and Lagler (1958), but are modified for macrourids as indicated by Gilbert and Hubbs (1916) and Iwamoto (1970).

Proportional measurements are not given as the customary percentages of the standard length, because of the usual greater or lesser loss and abrupt regeneration of the caudal tip to form a pseudocaudal fin. In place of following Gilbert and Hubbs (1916) in using as a measurement base the length from snout tip to anus (which is highly variable due to the frequent distortion caused by the dorsal flexure of the head), it has become common to employ as the base the head length, from the extreme tip of the snout to the most posterior bony margin of the opercle.

In the Material Examined sections, the museum catalog number for each lot is followed, in parentheses, by the number of specimens and their ranges of head length and total length. Locality and capture data complete the information for each lot. Depths, when originally given in fathoms, have been converted to the nearest meter. Abbreviations generally follow those suggested in "The Council of Biology, Editors Style Manual" (American Institute of Biological Sciences 1972). Others used include: cr.—cruise; HL—head length; IKMT—Isaacs-Kidd midwater trawl; m.w.o.—meters of wire out (of towing warp); R/V—research vessel; sta.—station; TL—total length.

Museum abbreviations are as follows: CAS—California Academy of Sciences, San Francisco, California; FAKU—Faculty of Agriculture, Kyoto University, Maizuru, Japan; LACM—Museum of Natural History of Los Angeles County, California; PPSIO—P. P. Shirshov Institute of Oceanology, Academy of Sciences USSR, Moscow; SIO—Scripps Institution of Oceanography, University of California, San Diego, La Jolla, California; USNM—National Museum of Natural History, Smithsonian Institution, Washington, D.C.; VIMS—Virginia Institute of Marine Science, Gloucester Pt., Virginia; ZMUC—Zoological Museum, University of Copenhagen.

Acknowledgments

We thank the many persons, who, in various ways, have helped us in the completion of this paper. The following provided or helped in the loan of specimens: E. H. Ahlstrom and H. G. Moser (National Marine Fisheries Service (NMFS), La Jolla, California); M. A. Barnett (SIO); F. H. Berry (NMFS, Miami, Florida); T. M. Clarke (University of Hawaii); P. Fourmanoir (ORSTOM, Noumea); K. Fujita (Tokyo University of Fisheries); A. Fleminger (SIO); L.

N. Knapp (Smithsonian Oceanographic Sorting Center, Washington, D.C.); K. Kuronuma (Tokyo); R. J. Lavenberg (LACM); K. F. Liem and T. McLellan (Museum of Comparative Zoology, Harvard); D. F. Markle (VIMS); I. Nakamura (FAKU); J. Nielsen (ZMUC); N. V. Parin (PPSIO); R. H. Rosenblatt (SIO); and P. J. Struhsaker (NMFS, Honolulu).

J. E. Fitch, California Department of Fish and Game, Long Beach, California, provided the slide used in Figure 3 along with information on the otoliths of *Mesobius berryi*.

H. Geoffrey Moser very kindly and skillfully drew for us the early prejuvenile of *Mesobius berryi* (Fig. 6). Other illustrations were drawn by K. P. Smith (Fig. 11), C. Pape (Figs. 2 & 4). (Other figures, 5, 7, 8, 10, were drawn by T. Iwamoto.) Radiographs were made by J. E. Gordon.

For their critical review of the manuscript we thank William N. Eschmeyer, N. B. Marshall, and Richard H. Rosenblatt.

Mesobius Hubbs and Iwamoto, new genus

TYPE-SPECIES.—*Mesobius berryi* Hubbs and Iwamoto.

DIAGNOSIS.—The two species of the genus are bathypelagic. Each has seven branchiostegal rays. The anus and the urogenital opening are surrounded by a raised margin of black naked skin and thus are removed from the origin of the anal fin by the width of that margin. A large light organ, lying anterior to the anus, abuts the anterior wall of the rectum (Fig. 5). The anus, the pelvic fins, and anal-fin origin are displaced far forward on the short abdomen; the distance from the isthmus to the anal-fin origin slightly exceeds the interorbital width, and is less than two-thirds the postorbital length. The mental barbel is absent. The sensory pores of the head are small and inconspicuous. The dentition in both upper and lower jaws comprises narrow bands of small depressible teeth, with none enlarged; the upper-jaw tooth bands are widely separated at the symphysis. The body scales (Fig. 4A) are small and thin. Those near the dorsal and ventral margins of the trunk and tail bear 1–3 small, erect spinules on the exposed field; some of the scales along the flanks lack spinules. The scales on the head (Fig. 4B) are uniquely elongated; each bears 1–3 rows of spinules that form low, sharp ridges with 2–9 spinules per row. The head and body are compressed. The eyes of adults are only moderately enlarged (orbit diameter 23–31 percent of head length). The mouth is large (upper-jaw length 40–47 percent). The gill-membranes are narrowly attached to the isthmus and have a narrow posterior free fold. The wide opercular opening extends anteroventrally to a vertical about one corneal diameter behind the orbit. The first (outer) gill-slit is restricted. The greatly reduced gas-bladder bears two retia and two gas glands. Some of the short caeca are bifid at the base. Postlarvae and prejuveniles pass through a polka-dotted ("phalacromacrurus") stage; adults are mostly black. Styloptery (referring to the stalked pectoral fins) of the postlarvae is extreme, reminiscent of the stylophthalmy (greatly stalked eyes) of the postlarvae of *Idiacanthus*.

RELATIONSHIPS.—*Mesobius* is referable to that group of macrourine rattails that has in common the combination of seven branchiostegal rays and the anus only slightly removed from the anal fin by the width of a broad, circumanal margin of naked black skin. Related genera include *Echinomacrurus* Roule, *Trachonurus* Goode and Bean, *Cetonurus* Günther, *Paracetonurus* Marshall, and *Sphagemacrurus* Fowler. Of these genera, *Mesobius* seems closest to *Echinomacrurus*, a monotypic genus of the eastern North Atlantic and western Indian Ocean (Marshall 1973:600).

These two genera are similar principally in having a relatively short trunk (with pelvic and anal fins and anus far forward), much reduced or lacking gas-bladder, black coloration, reduced or absent chin barbel, and small teeth in narrow bands in each jaw. These characters, however, may reflect convergent life styles rather than phylogenetic proximity. The degree to which each character is developed in *Mesobius* and *Echinomacrurus* as a specialization to a bathypelagic habit is generally the more extreme in *Mesobius*, a strictly bathypelagic fish, and less modified in *Echinomacrurus*, a sometime dweller of the bathypelagic realm. Interestingly, however, the gas-bladder is entirely lacking in *Echinomacrurus* (Marshall 1973:509), but is only regressed in *Mesobius* (a condition that one might not expect). In the two other bathypelagic genera, *Cynomacrurus* Dollo and *Odontomacrurus* Norman, the gas-bladder is also regressed (Marshall 1964). Significantly, all of these bathypelagic genera have weakly ossified skeletons.

Aside from the characters mentioned above (and until the internal morphology of both genera has been more closely compared), there appear to be few characters that would indicate close relationship between *Echinomacrurus* and *Mesobius*. The differences between the two genera are more obvious. Whereas *Mesobius* has a compressed head with only a moderate development of mucous chambers, in *Echinomacrurus* the head is broad and inflated, "due mainly to the very wide lateralis canals" (Marshall 1973:598). The mouth of *Mesobius* is large and almost terminal, whereas that of *Echinomacrurus* is small and inferior. The greatly elongate and closely seriated head scales of *Mesobius* contrast sharply with the small, round, non-imbricate scales of *Echinomacrurus*.

Mesobius is far removed from three other strictly bathypelagic macrourids: *Odontomacrurus murrayi*, *Cynomacrurus piriei* and *Nezumia parini* Hubbs and Iwamoto. *Odontomacrurus* and *Cynomacrurus* each has six branchiostegal rays, large fanglike, jaw teeth, and large open sensory pores on the head. *Mesobius*, in contrast, has seven branchiostegal rays, small teeth in a narrow band in the jaws, and no apparent open sensory pores on the head. *Nezumia parini*, like *Mesobius*, has seven branchiostegal rays and a light organ closely associated with the anus, but the position of the periproct (distantly removed from anal fin and closer to pelvic fins), the presence of a strong suborbital ridge and a stout terminal snout scute, the relatively small, inferior mouth, and the restricted gill membranes, all indicate that *Nezumia parini* is a member of a phylogenetic line very divergent from that of *Mesobius*. It appears then, that the bathypelagic macrourids have had a diverse origin, and that they are not from one evolutionary line but from several.

Distribution.—From our study material, the genus appears to be confined to the Pacific Ocean—*M. berryi* to the northeastern portion and *M. antipodum* to the southwestern portion. Dr. N. B. Marshall, however, writes (*in litt.*, 17 March 1976) of having found a young *Mesobius* in the Dana collection (sta. 1166 IV, 10°16'N, 40°41'W), and that he now believes that the polka-dotted young reported by Backus *et al.* (1965) as *Sphagemacrurus*? is also a *Mesobius*. He concludes: "I expect that *Mesobius* has a world-wide distribution between the subtropical convergences."

Table 1. Frequency Distributions of Selected Counts of *Mesobius berryi* Hubbs and Iwamoto. Abbreviations: First Dorsal Fin—1D.; Pectoral Fin—1P.; Pelvic Fin—2P; Gill-Rakers on Medial Row of First Arch—GR I; Gill-Rakers on Medial Row of Second Arch—GR II.

	7	8	9	10	11	12	13	14	$\bar{x}$
1D.				3	9	3			11.00
1P.*						3	21	5	13.07
2P.*	11	17	2						7.70
GR I				1	4	7	3		11.80
GR II				2	11	2			11.00

* Includes counts of both right and left fins from each specimen.

Etymology.—The name *Mesobius* is derived from μεσος (mesos), middle, and βιος (bios), life, referring to the bathypelagic habitat of the genus.

Mesobius berryi Hubbs and Iwamoto, new species

(Figures 1–8, 10A; Tables 1–3)

"Macrouridae, unidentified" Berry and Perkins 1966:668 ("an undescribed genus and species of bathypelagic macrouroid"; two specimens from R/V Cobb, cr. C6303, sta. 86.92, 305 km SW of Point Conception, California, in approximately 640 m.)

Diagnosis.—A species of the genus *Mesobius* with 12–17 pyloric caeca; medial gill-rakers on first arch 10–13, on second arch 10–12; snout length 23–28 percent and interorbital width 28–34 percent of head length.

Description of Adults.—Selected counts are given in Table 1 and measurements in Table 2.

General Adult Features: The general adult features of this unique fish may be seen in the illustration of the holotype (Fig. 1). The head and body are compressed; the greatest width of the head is about half the greatest body depth. The fin rays are fragile and slender, and the skeleton is poorly ossified. Most of the dermal head bones are thin, in part almost membranous. The integument of the head and body is thin, but is not membranous (as it is in members of the genus *Hymenocephalus*). The temporal region of the head is much enlarged. The high supraoccipital crest forms a distinct arch in the dorsal profile. Ventral aspects of the abdomen are short; the distance from the isthmus to the anal fin is about 1.0 1.5 orbit diameters. The anus, pelvic fins, and anal-fin origin are displaced

TABLE 2. SELECTED MEASUREMENTS FROM 15 TYPE-SPECIMENS OF *Mesobius berryi*. TOTAL LENGTH AND HEAD LENGTH IN MILLIMETERS; OTHERS IN THOUSANDTHS OF HEAD LENGTH.

	LACM 35671	SIO H51–87	LACM 30083–17	LACM 8638	CAS 30469	USNM 215326	CAS 30471	SIO 73–170	CAS 30470	USNM 215326	SIO 72–374	SIO 73–327	USNM 215327	USNM 215327	LACM 9579–16
Total length	165	182	190	170	257	307	340	344	316	345	358	397	333	374	392
Head length	15.7	16.7	26	33	49	57	61	61.8	62	62	64	65	65.8	68.9	70
Postrostral length	822	790	769		796	772	754	773	790	742	734	739	760	784	771
Snout length	229	198			276	263	262	272	274	266	266	277	284	247	270
Orbit diameter	318	371	296	258	251	251	241	301	226	306	227	231	274	269	239
Interorbital width	191	240	300	327	286	281	290	303	277		294	292	304	337	314
Postorbital length	465	401	477		510	526	557	599	548	532	500	523	502	522	529
Orbit to angle preop.	389	401	419	424	469	491	508	510	500	500	484	492	491	467	500
Suborbital width	115	180	162	188	151	144	154	144	134	137	136	138	152	145	143
Length upper jaws	459	557	412	439	445	456	459	466	403	468	430	400	441	440	439
Preanal length	911							1,019	984				1,033	987	1,014
Outer pelvic to anal	306	407	204		104	123	134	129	94	116	125	138	122	131	129
Isthmus to anal	510		392	273	265	333	246	275	258			277	334	276	286
Greatest body depth	796		923	788		737		809	742	758		708	790	769	786
1D.–2D. Interspace	255		415	333	378	351	475	421		435	594	477		392	386
Height 1D.					510		508	502	484	532	625		502	493	414
Length 1P.				606	612	579	656	518	452	565			517	552	
Length 2P.				318		386		307	339	403		292		363	
Length outer gill-slit	248	293	208	179	184	175	187	178	156	165	164	172	175	183	176

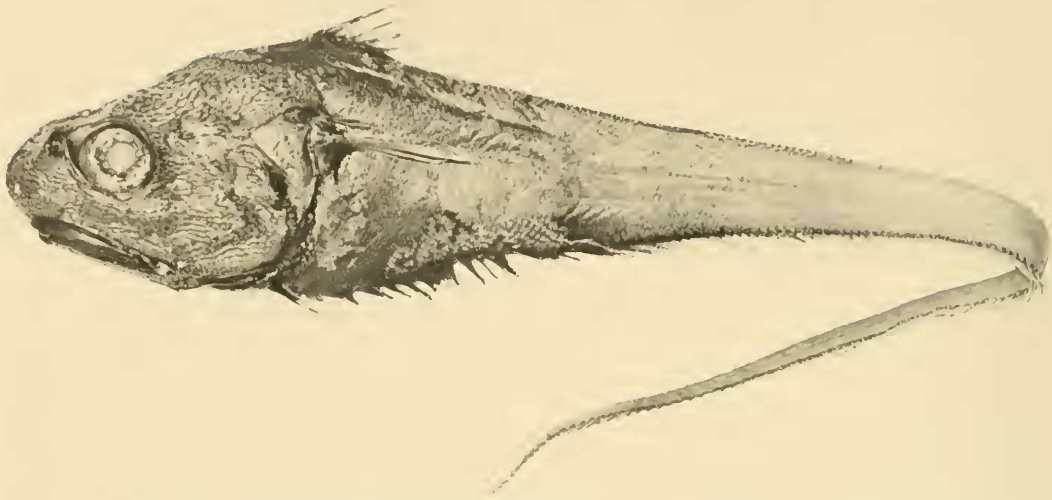

FIGURE 1. *Mesobius berryi* Hubbs and Iwamoto. Holotype, SIO 73–170, 61.8 mm HL, 344 mm TL, captured in midwaters of the central equatorial Pacific at an estimated depth of 0–1280 m.

much farther forward than in most other macrourids (but about the same as in *Odontomacrurus murrayi* and *Cynomacrurus piriei* and in species of *Sphagemacrurus* and of subgenus *Lucigadus* of genus *Ventrifossa*). The posterior margin of the opercular bones are finely scalloped or crenulated. The interopercle is naked and scarcely exposed beyond the ventral and posterior margins of the large preopercle. The large lower jaw bears a pronounced knob at the symphysis. A small tubercle below the symphysis may be the remnant of a chin barbel. The gills occupy a relatively small portion of the capacious gill cavity; the tubercular rakers are widely spaced along the gill-arches. The short gill-filaments, measuring less than 1.5 in pupil diameter, are poorly developed in comparison with those of benthopelagic relatives (Fig. 2). The pyloric caeca are short and thick (some are bifid at the base); four central Pacific specimens yield 12, 13, 16, and 17 tips. Eleven abdominal vertebrae were counted in five specimens.

After examining four left-sagittal otoliths, John E. Fitch, California Department of Fish and Game, who provided the slide from which Figure 3 was taken, has stated (*in litt.*, 14 July 1975) that:

> "Very few kinds of fish show such a radical change in otolith shape as does *Mesobius*. Typically lobular margins are a juvenile character, except among cods and a few others in which they are a family character. The three smallest *Mesobius* otoliths show differences other than the juvenile lobular margins."

Fins: The first dorsal is small, with the greatest height less than the postorbital length. The first of the two spinous anteriormost rays is small and thornlike; its sharp leading edge is armed in some specimens with one or two minute denticles. The second ray is much longer, more slender, and near the base it is triangular in cross-section; its rather sharp leading edge bears small, often irregular serrations in most small specimens and in some large ones. The low second dorsal is poorly developed throughout. The relatively slender, pointed, narrow-based pectorals are inserted high on the body, much nearer the dorsal than the ventral body contour. The pelvics are small and slender. The anal is moderately well developed over its entire length and is much larger than the second dorsal. The pelvics originate below the posterior part of the preopercle; the anal origin lies below the pectoral base and below the anterior third of the first dorsal.

Scales: The scale structure is characterized in the diagnosis of the genus. The head is almost completely scaled except on the gill-membranes, lips, interopercle, and on the small narial fossa. In some specimens with heads longer than about 40 mm, the body scales, except those ventrally on the abdomen, over the nape, and around the base of the first dorsal, are devoid of spinules. The scales on the pectoral base are very thin, non-spinulated, and highly deciduous (only a few remain on one specimen). The orientation of

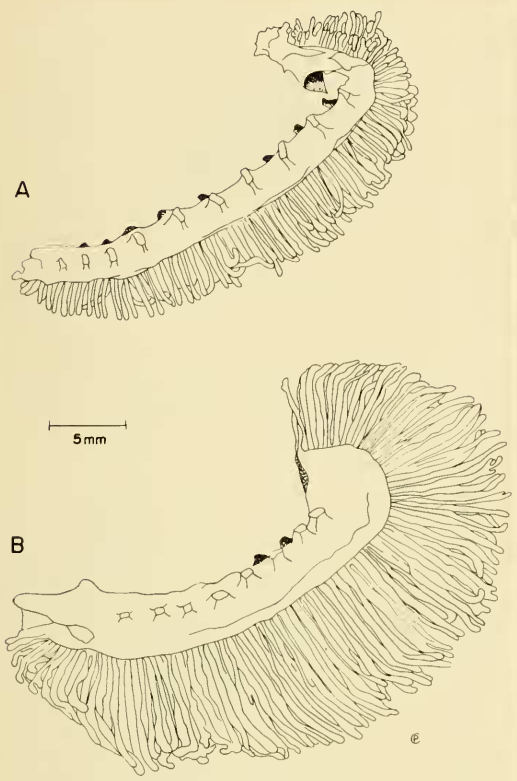

FIGURE 2. Right outer gill-arch of (A) *Mesobius berryi* and (B) *Nezumia liolepis*, comparing relative size of filaments of the two species. Drawn by Cherryl Pape.

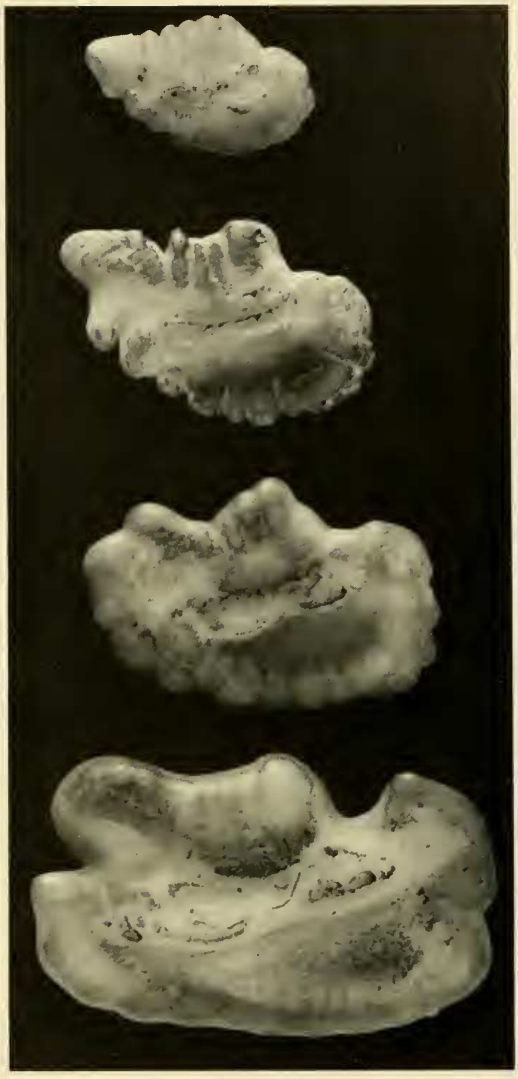

FIGURE 3. Otoliths (left sagittae) from four specimens of *Mesobius berryi*. Top to bottom: LACM 9585–20 (178 mm TL); LACM 30083–17 (26 mm HL, 190 mm TL); LACM 8638 (33 mm HL, 170 mm TL); LACM 9579–16 (70 mm HL, 392 mm TL). Otolith lengths are, respectively, 3.4 mm, 4.8 mm, 5.3 mm, and 7.1 mm. Photograph provided by John E. Fitch.

the elongate head scales (Fig. 4) and the associated spinule rows render the head surface striated, in groups of varying, parallel courses. Over the temporal region the changing alignments, in more or less sigmoidally curved groups, are particularly conspicuous, from the area behind the orbit upward and backward over the nape.

Gas-bladder: The very small, elliptical bladder has a small nib pointed posteriorly; in a 40-mm-HL specimen the organ is 6 mm long. The external tunica of the gas-bladder is thin and transparent, but tough. What appear to be two gas glands are enveloped in flocculent, white, lipoidal material. Retia, attached to the gas glands, emerge anteroventrally from the gas-bladder.

Light Organ: Partial dissection of a 64-mm-HL paratype (SIO 72–374) indicates that this species has a relatively large oval or bean-shaped structure, presumably a light organ, encapsulated in a thin layer of muscle, and fronting the lower wall of the rectum. A midsaggital section through the organ (Fig. 5) reveals horizontally oriented folds of tissue with free borders posteriad. Anteroventral to the light organ is a small area, where the tissue is relatively translucent, that may serve as a "window" through which light is transmitted to the exterior. The absence of a large internal lens fronting the light

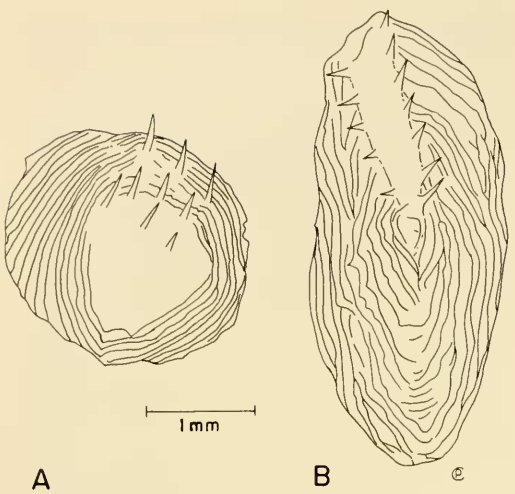

FIGURE 4. Scales from *Mesobius berryi*: (A) from below first dorsal fin; (B) from posttemporal region of head. Drawn by Cherryl Pape.

organ, so typical of most members of genera *Malacocephalus*, *Ventrifossa*, and *Nezumia*, indicates that *Mesobius* is a phylogenetically divergent member of the macrourid group characterized by having seven branchiostegal rays and an abdominal light organ.

Coloration in Alcohol: Adults are black or brownish black over the entire head and body, with a violet tinge over the trunk region. The tail surfaces are somewhat paler than the more anterior surfaces.

DESCRIPTION OF YOUNG.—A postlarva of 12 mm total length (SIO 72–14) has a head length of about 1.7 mm. The mouth is oriented almost vertically with the posterior end of the upper jaw lying on a vertical through the anterior edge of the eye. The diameter of the large eye measures less than 3 in HL, and is roundish, with a posterior bulge. The interorbital region is much narrower than the pupil. The abdomen is heavily pigmented with large melanophores. The anus is centrally located on the ventral midline. A black conical mass, the light organ, extends anteriad from the anus to between the bases of the pelvic fins. Rays of the anal fin appear to arise slightly anterior to the posterior end of the abdominal cavity. The pelvic-fin bases and the anus lie forward of the pectorals, which, in turn, lie slightly anterior to the origin of the first dorsal fin. The remarkably stylopterous pectorals are attached at the end of a slender pedicel about as long as the postorbital portion of the head.

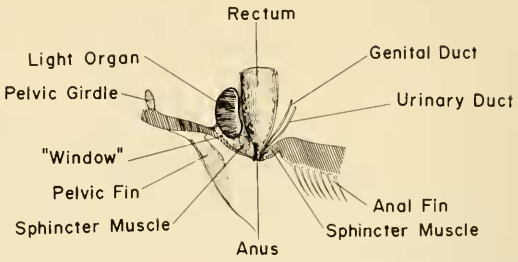

FIGURE 5. Diagrammatic illustration of midsaggital section through rectum and light organ of *Mesobius berryi*.

Large prominent blotches occur on the snout, the tip of the lower jaws, the posterior angle of each side of the lower jaw, the posterior portion of the interorbital region, over the occipital region of the skull, over the posttemporal region, on the preopercle just behind the orbits, and at the anterior edge of the base of the first dorsal fin. A series of uniformly spaced saddle marks extends along the dorsal margin of the tail, and dashlike marks along the ventral margin of the tail are spaced about half as far apart as are the dorsal saddle marks.

An early prejuvenile (SIO 75–465; Fig. 6), 23.4 mm in total length to tip of the broken tail, has essentially the same characteristics as those of the 12-mm specimen just described except that the periproct region, the anal origin, and the pelvic fins are situated somewhat farther forward, and the dashlike marks on the ventral profile of the tail are larger and more widely spaced. The stylopterous pectorals are still well developed.

In a 73-mm specimen (SIO 63–119), with head about 6.3 mm long, the mouth is still steeply oblique. The interorbital space is slightly narrower than the pupil. The anus and pelvic fin appear to have swung so far forward that they lie directly under the hind end of the opercle. The base of the pectoral fin is no longer pediculate but is reduced as in normal adults. Denticles along the leading edge of the second spinous dorsal ray are slender, sharp, and well developed. Spots on the head and body closely resemble those of a larger individual illustrated in Figure 7 (top). The saddles below the second dorsal and the dash marks along the anal are, however, more numerous and more prominent, especially posteriorly on the tail. Size-related changes in color pattern, from this size on, closely parallel those described for *Odontomacrurus murrayi* by Marshall (1964).

A prejuvenile specimen (Fig. 7, top) 15.7 mm

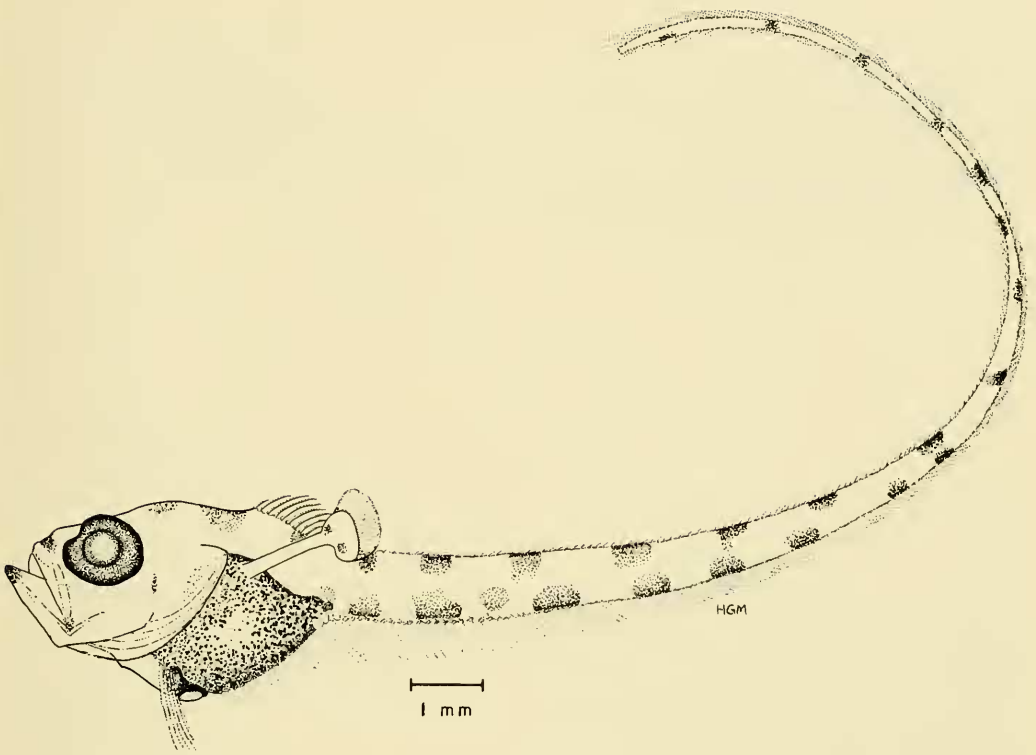

FIGURE 6. Early "phalacromacrurus" prejuvenile of *Mesobius berryi*, trawled in midwater at 31°15.0'N, 132°07.8'W, in the open eastern Pacific between southern California and Hawaii. Length 23.4 mm to broken tip of tail. Dorsal and anal rays diagrammatically shown. Drawn by H. Geoffrey Moser.

in head length (LACM 35671), does not differ significantly in general features from individuals half as large. The medium-brown trunk becomes paler posteriad on the tail to tan. The head is tan with scattered punctulations, and the body and head display series of large, prominent, circular, brown blotches as illustrated. A small dark spot is located dorsomedially on the nape, and there is another on the tip of the lower jaw. (In a specimen of comparable size (SIO H51–87, 16.7 mm HL), the spots are relatively smaller, and those along a file dorsally and midlaterally are more closely approximated.) The elongate scales on the head and the linear arrangement of the spinules on the scales are evident even at this early stage. Spinules are few on each scale, and they are slender, conical and erect. The circular scales on the body generally have only one to two spinules, and some scales along the ventral margins of the body and tail completely lack spinules.

In a somewhat larger individual (LACM 30083–17) of about 26 mm HL (Fig. 7, bottom), the overall color is much darker, generally brownish black. The blotches of the body are relatively smaller and are becoming obliterated by the dark ground color; a spot along the posterior base of the first dorsal fin, however, is very dark. In head and body configurations, this stage already resembles that of the adult. The mouth is nearly horizontal, the interorbital region is broad and rounded, and the ventral aspects of the trunk have already shifted posteriad approximately to their adult location.

A still larger individual (SIO 73–329), 40 mm in head length, has essentially the adult configuration and coloration—it is very blackish over the head and trunk, but slightly paler over the tail, on which faint traces of the lateral blotches still remain.

COMPARISONS.—A comparison of specimens from the eastern and from the central Pacific discloses no significant regional differences. Selected measurements and counts are tabulated

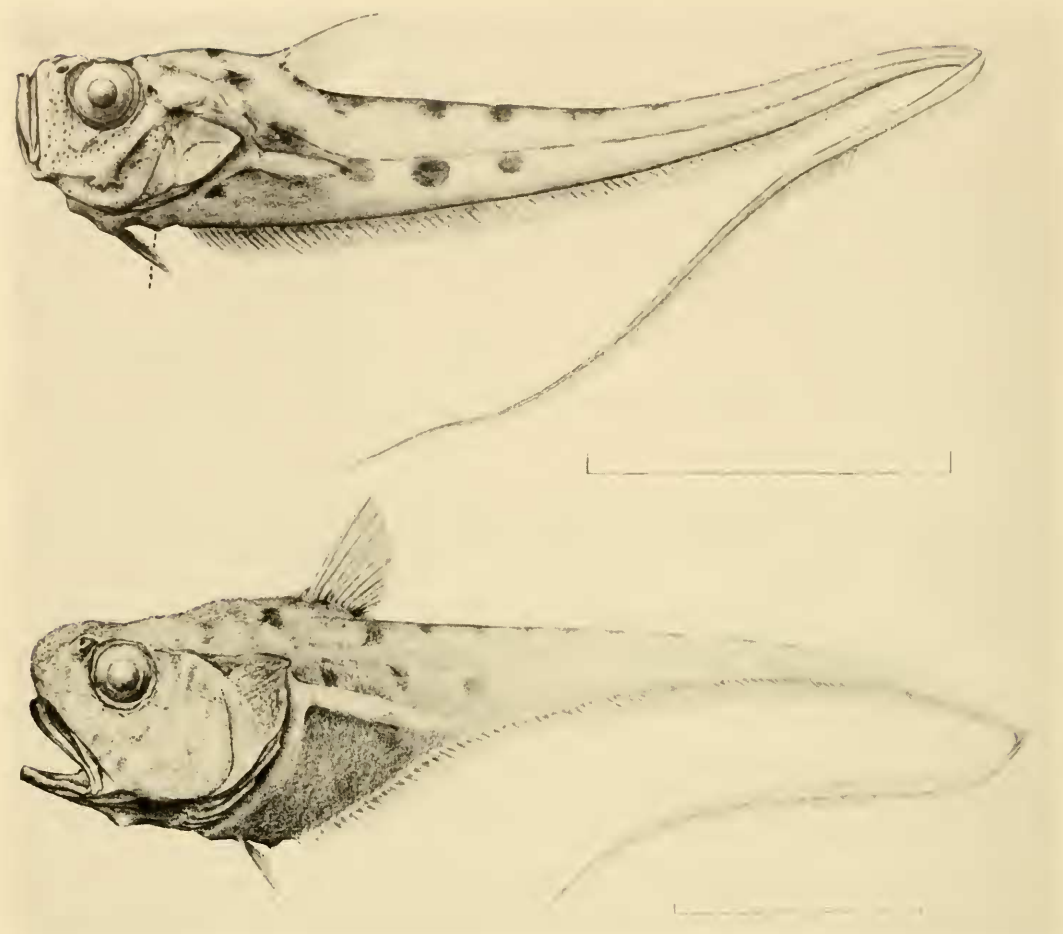

FIGURE 7. Diagrammatic illustrations of *Mesobius berryi* showing gross pigmentation patterns in juveniles 15.7 mm in head length (LACM 35671) (top) and 26 mm in head length (LACM 30083–17) (bottom). Fins and head partially reconstructed. Scales indicate 25 mm.

(Table 3) for the comparison of specimens from these two regions, and for contrast with the single New Zealand specimen of *Mesobius antipodum*. The flabbiness of the fish and the consequent difficulty in making accurate measurements calls for some reservation in evaluating the morphometric data.

The peculiar polka-dotted pigmentation pattern in early-life stages of *Mesobius* is not restricted to the genus but is also characteristic of the young of *Odontomacrurus*, *Malacocephalus*, and, possibly, *Sphagemacrurus*. Maul and Koefoed (1950) described two polka-dotted macrourids as representatives of a new genus and species, *Phalacromacrurus pantherinus*, but Marshall (1964) showed that their specimens were juveniles of *Odontomacrurus murrayi*. Marshall (1964:Fig. 3) also figured a polka-dotted juvenile of *Malacocephalus*. Backus et al. (1965) illustrated what they assumed to be a juvenile *Sphagemacrurus* (taken in the eastern Atlantic) that had a pigmentation pattern almost identical with that of *M. berryi*. We have attempted to borrow that specimen, which supposedly was deposited in the Museum of Comparative Zoology, but the curators there have reported their inability to find it. *Sphagemacrurus* is not, as far as we know, known from the eastern Pacific. Marshall (1973:514) considered *Macrurus trichiurus* Garman and *M. fragilis* Garman as belonging to that genus, but the junior author's examination of the holotypes has revealed that the former is clearly

conspecific with *Nezumia convergens* (Garman) and the latter is probably close to *Paracetonurus* Marshall. The species of *Sphagemacrurus* have 10–13 pelvic fin rays as compared with 9 or fewer in species of *Mesobius*.

The genus *Odontomacrurus* is not known from the Pacific, as far as we know, although Fourmanoir (1969) reported two specimens of *Phalacromacrurus pantherinus* from the stomachs of lancetfish, *Alepisaurus*, taken off New Caledonia and New Hebrides. Mr. Fourmanoir has informed us (*in litt.*, 16 Dec. 1975) that the two specimens had apparently been discarded.

Malacocephalus has not previously been known from the eastern Pacific, although representatives are found in the Hawaiian Islands, off Japan, in the Philippines, and in Australian waters. We have, however, examined one adult specimen of a *Malacocephalus* (Santa Barbara Natural History Museum no. 0061) taken off Santa Barbara, California. It represents the only record of the genus from the eastern Pacific. The polka-dotted juveniles of *Malacocephalus* are readily distinguishable from those of *Mesobius* by having a chin barbel (developed even in a specimen (VIMS 03922) of *Malacocephalus* sp. 8 mm in HL), a pale esophageal portion of the stomach (blackish in *Mesobius*), and a prominent scaleless area anterior to the periproct.

DISTRIBUTION.—*Mesobius berryi* has been captured in midwater nets fished as shallow as 0–313 mm to as deep as 0–2700 m. Most of the captures have been in trawls hauled to at least 650–1000 m, in waters off southern California, off Baja California (Mexico), off Oahu in the Hawaiian Islands, and in the central North Pacific 8–10 degrees of latitude north of the Hawaiian Islands, and in the equatorial mid-Pacific off Christmas Island (Fig. 8). The species appears to have a distribution pattern similar to that of the myctophiform fish, *Evermannella ahlstromi*, which is apparently "limited to areas transitional in properties between major Pacific upper water masses" (Johnson and Glodek 1975:725). Unlike *E. ahlstromi*, however, *Mesobius berryi* does not extend into the easternmost sector of the Pacific equatorial water mass but is apparently replaced there by *Nezumia parini*, the only other known bathypelagic member of the family in the eastern Pacific Ocean.

ETYMOLOGY.—The species is named for Frederick H. Berry, now of the Southeast Fisheries Center, Miami Laboratory, of the National Marine Fisheries Service, who first collected the species, brought it to the attention of the senior author, and reported it as "Macrouridae, unidentified" (Berry and Perkins 1966:668).

TABLE 3. *Mesobius* SPP. COUNTS AND MEASUREMENTS COMPARED BY LOCALITY. PROPORTIONAL MEASUREMENTS IN PERCENTAGE OF HEAD LENGTH. MORPHOMETRIC DATA FOR SPECIMENS SMALLER THAN 33 MM HL EXCLUDED.

Species	*berryi*		*antipodum*
Location	Eastern Pacific	Central Pacific	New Zealand
No. of specimens	4	8	1
COUNTS:			
Gill-rakers on first arch	11–13*	10–13	15
Gill-rakers on second arch	10–12*	10–12	16
Pyloric caeca		12–17†	ca. 38
MEASUREMENTS:			
Total length (mm)	170–392	257–397	390
Head length (mm)	33–70	49–65	75
Snout length	24–27	26–28	32
Interorbital length	30–34	28–30	36
Preanal length	99–103	98–102	114
Outer pelvic ray to anal origin	12–13	9–14	19
Isthmus to anal origin	27–33	25–33	40
Body depth	77–79	74–81	84

* Counts from seven specimens.
† Counts from four specimens.

MATERIAL EXAMINED.—*Holotype*. SIO 73–170 (61.8 mm HL, 344 mm TL): mid-equatorial Pacific, 00°03.8′–07.0′N, 154°56.0′W, midwater trawl; estimated fishing depth 0–1280 m, 3000 m.w.o.; R/V GEORGE MELVILLE cr. CATO 2, tow 82, 17 July 1973.

Paratypes. **Eastern Pacific** (8 specimens).—LACM 35671 (1, 15.7 mm HL, 165 mm TL): Mexico, off Isla Guadalupe, 29°30.0′N, 119°10′W; IKMT; 0–313 m, 3000 m.w.o., bottom depth 1850 m; R/V VELERO sta. 9904, 8 Aug. 1964.—LACM 8638 (1, about 33 HL, 170 TL); California, Santa Catalina Basin, 33°22′15″N, 118°45′00″W; midwater trawl; 1313–1298 m, 7000 m.w.o.; R/V VELERO sta. 10259, 13 Jan. 1965.—LACM 9579–16 (1, 70 HL, 392 TL): Mexico, off Isla Guadalupe, 30°30′20″N, 118°49′59″W; IKMT; about 1273 m.w.o.; R/V VELERO sta. 11226 30 Aug. 1966.—LACM 30083–17 (1, about 26 HL, 190 TL): Mexico, off Isla Guadalupe, 28°15′00″N, 118°12′00″W; 10-ft IKMT; about 919 m.w.o.; R/V VELERO sta. 12079, 14 April 1968.—SIO H51–87 (1, 16.7 HL, 182 TL):

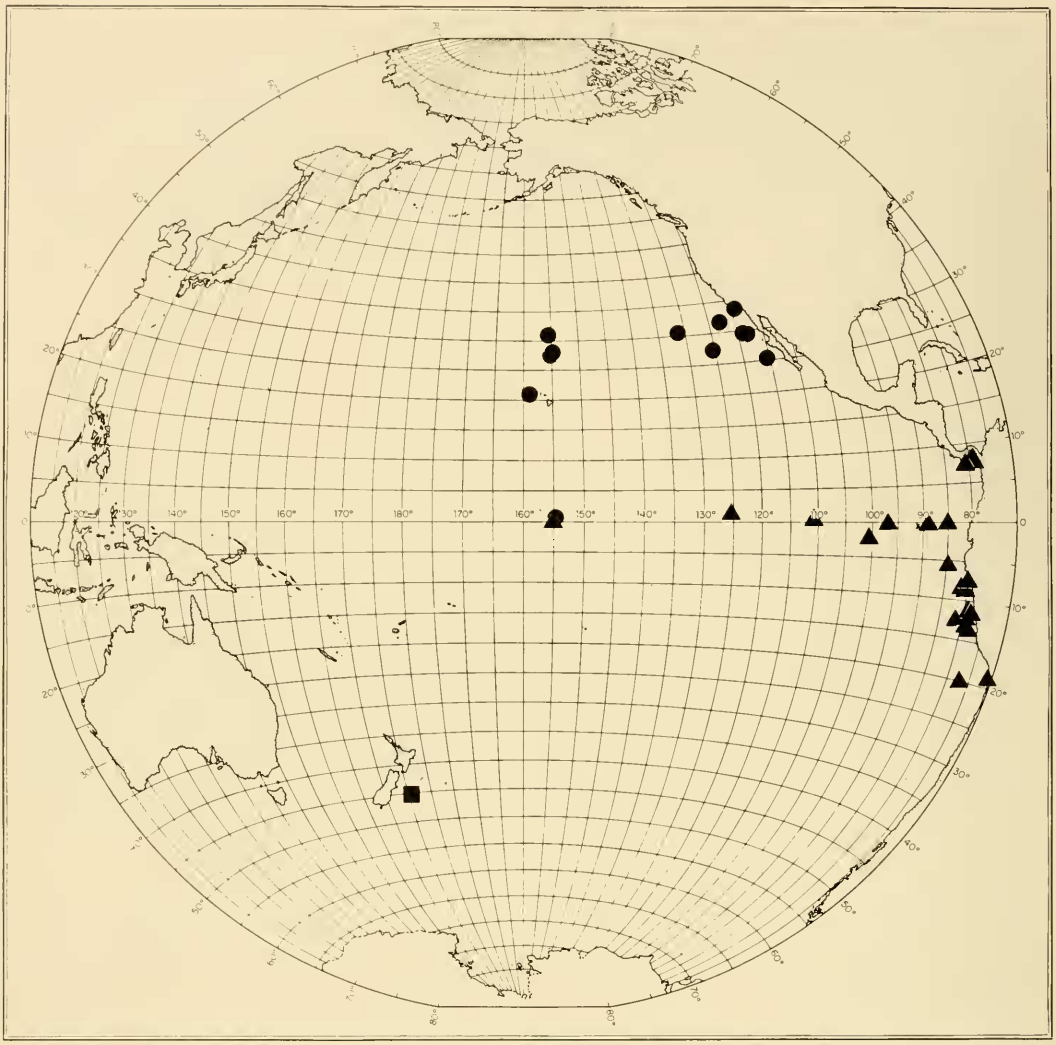

FIGURE 8. Distributions of *Mesobius berryi* (circles), *M. antipodum* (squares), and *Nezumia parini* (triangles).

Mexico, off Baja California Norte, 25°29′–31′N, 115°24′–09′W; midwater trawl; 1902 m, 21 Mar. 1951.—SIO 63–110 (1, about 6.3 HL, 73 TL): eastern Pacific W of Mexico, 27°22.6′N, 125°20.0′W; IKMT; 0–about 2700 m, 4500 m.w.o.; R/V HORIZON cr. 6204H, sta. 100.160, 16 Apr. 1962.—USNM 215327, formerly SIO 63–374 (2, 66–69 HL, 333–374 TL): California, WSW of San Diego, 32°07.3′–00.5′N, 122°39.5′–41.4′W; Cobb Pelagic Trawl Mark II; fishing depth about 640 m, bottom depth 4209 m, 1738 m.w.o.; R/V COBB cr. 58–7, sta. 86.92, 6 Mar. 1963.

Central Pacific (10 specimens).—CAS 20470 (1, 62 HL, 316 TL): SW of island of Oahu, Hawaii, 21°20′–30′N, 158°20′–30′W; 10-ft IKMT; fishing depth 1150 m, 3300 m.w.o.; R/V TERITU sta. 70–9–20, 21 Sept. 1970.—CAS 30469 (1, 49 HL, 257 TL): data as previous lot except depth about 1000 m, 2850–3000 m.w.o.; sta. 70–12–13, 11–12 Dec. 1970.—CAS 30471 (1, 61 HL, 340 TL): data as previous lot except depth 950–1000 m, 2700 m.w.o.; sta. 70–12–30, 16 Dec. 1970.—USNM 215326 (2, 57–62 HL, 307–345 TL): data as previous lot except depth 700–800 m, 2000 m.w.o.; sta. 73–9–24, 25 Sept. 1973.—SIO 72–14 (1, about 1.7 HL, 120 TL): 27°20.6′–23.5′N, 155°20.7′–23.5′W, IK plankton trawl, 1000 m.w.o.; R/V THOMAS WASHINGTON Exped. Aries 9, sta. PS1, 26 Sept. 1971.—SIO 72–374 (1, 64 HL, 358 TL): 30°56.7′–59.7′N, 155°24.3′–16.3′W; Isaacs-Brown closing midwater trawl; fishing depth 970 m, 1700 m.w.o.; R/V GEORGE MELVILLE cr. CATO 1, tow 41, 30 June 1972.—SIO 73–329 (1, about 40 HL, 221 TL): 28°03.5′–12.9′N, 154°38.8′–36.5′W; 10-ft IKMT; 3000 m.w.o.; R/V THOMAS WASHINGTON cr. TASADAY I, tow 42, 22 June 1973.—SIO 73–327 (1, 65 HL, 397 TL): 27°58.6′–28°07.2′N, 154°57.8′–155°07.5′W; 10-ft IKMT; 3000 m.w.o.; R/V THOMAS WASHINGTON cr. TASADAY I, tow 17, 18 June 1973.—SIO 75–465 (1, 23.4 mm TL): 31°15.0′N, 132°07.8′W; oblique plankton tow hauled obliquely between 0 and 141 m, bottom depth 4691 m; R/V HORIZON cr. H6204–05, sta. 70.200, 31 Mar. 1962.

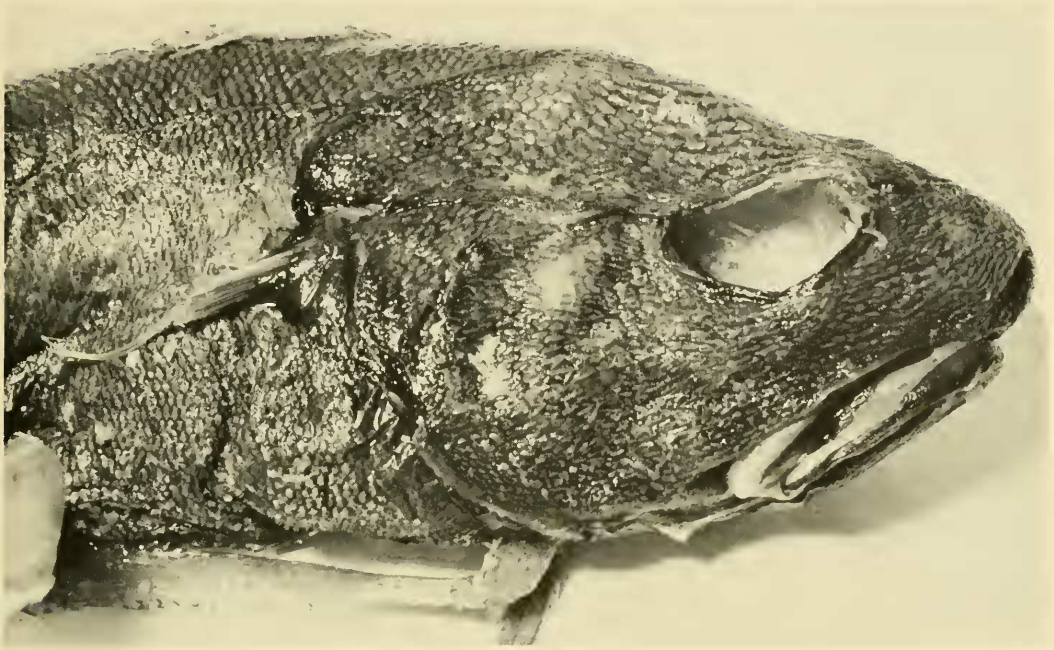

FIGURE 9. Holotype of *Mesobius antipodum* Hubbs and Iwamoto. FAKU 47812, about 75 mm HL, 390 mm TL with tail incomplete, from off South Island, New Zealand, in 995–1110 m.

Mesobius antipodum Hubbs and Iwamoto, new species

(FIGURES 8, 9, 10B; TABLE 3.)

DIAGNOSIS (based on one specimen).—A species of the genus *Mesobius* with about 38 small, branched pyloric caeca; medial gill-rakers on first arch 15, on second arch 16; snout length about 32 percent of head length; interorbital width about 36 percent of head length.

COUNTS.—First dorsal fin II,9; pectoral fin 14; pelvic fin 7/7; gill-rakers in medial row 2 + 13 on first arch and 2 + 1 + 13 on second arch; scales below origin of first dorsal fin about 13–14; scales below middle of first dorsal fin about 8–9.

MEASUREMENTS.—Total length 390 mm (with an incomplete tail); head length about 75 mm. The following proportional measurements are in thousandths of head length: postrostral length of head 720; snout length 320; orbit diameter 227; interorbital width 360; postorbital length of head 480; orbit to angle of preopercle 467; suborbital width 160; upper-jaw length 427; preanal length 1133; outer pelvic ray to anal origin 187; isthmus to anal origin 400; greatest body depth 840; interspace between first and second dorsal fins 533; length pelvic fin 267; length outer gill-slit 172.

DESCRIPTION AND COMPARISONS.—Most features of this fish closely parallel those described for its congeneric relative *Mesobius berryi*. The high pyloric caeca count in this species results not from a larger caecal mass than found in *berryi* but rather from a greater branching of the mass to form more, and smaller, individual caeca. Larvae and juveniles are unknown, but we presume that individuals pass through a polka-dotted "phalacromacrurus" stage, as in *M. berryi*.

Because of the relatively poor condition of the holotype, and only specimen, precise measurements could not be made of most features. Differences between *M. antipodum* and *M. berryi* in morphometry (Table 3) may prove insignificant when additional specimens of *antipodum* are studied. Other features (meristic ones in particular), however, seem to confirm the differences suggested by the morphometric data. The holotype of *M. antipodum* appears to represent a much stouter, heavier-bodied species: the greatest breadth of the trunk is approximately

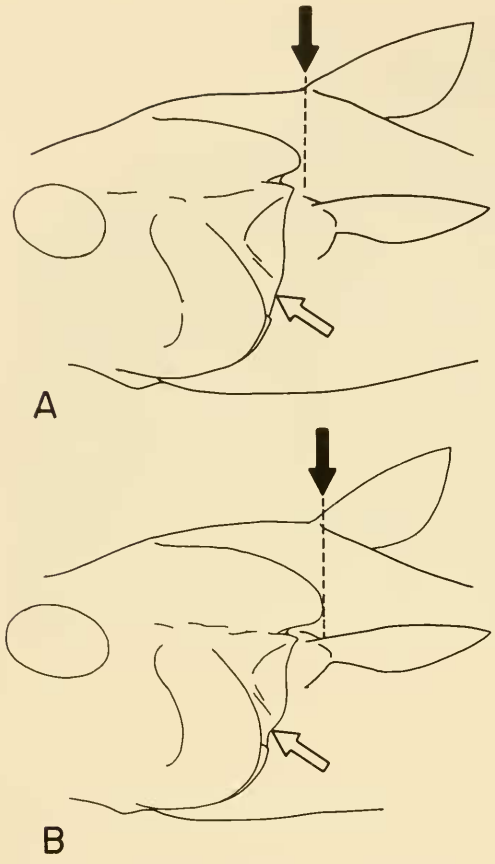

FIGURE 10. Diagram of posterior region of head of (A) *Mesobius berryi* and (B) *M. antipodum*, comparing the posterior extent of the posttemporal region (solid arrows) and the relative curvature of the subopercular margin (open arrows).

half the postrostral length of the head, whereas in *M. berryi* it is less than one-third that dimension. Although the holotype of *M. antipodum*, at 75 mm HL, is larger than the largest available specimen of *M. berryi*, the posterior nostril, at 2.8 mm, is much smaller (3.7 mm) than it is in the largest *M. berryi* specimen (LACM 9579–16, 70 mm HL). The shape of the opercle and subopercle in the two species appears to differ (Fig. 10; *cf.* also Figs. 1 and 9). The posterodorsal arm of the opercle is relatively much longer in *berryi* than in *antipodum*, and the posterior margin of the subopercle is more strongly incurved in *antipodum*. Finally, the sharply marked posterior margin of the posttemporal region (Fig. 10) in this species lies above the base of the pectoral fin, whereas in *M. berryi* it scarcely extends beyond the posterior margin of the opercle.

Because only one specimen of *M. antipodum* is known, little can be said about the distribution of the species. It would not be improbable to find that the species is widely distributed across the southern hemisphere, especially in the eastern sector, in temperate to tropical waters.

ETYMOLOGY.—The name is derived from the Latin *antipodum*, genitive of "antipodes," referring to persons dwelling at opposite points on the globe.

MATERIAL EXAMINED.—*Holotype*. FAKU 47812 (about 75 mm HL, 390 mm TL with tip of tail broken off): New Zealand, E of South Island, 44°44′S, 175°42.0′E; 995–1110 m; KAIYO MARU sta. 36, 16 July 1968.

Nezumia parini Hubbs and Iwamoto, new species
(FIGURES 8, 11; TABLES 4, 5.)

"A new bathypelagic species of *Nezumia*," Parin, Becker, Borodulina and Tchuvassov, 1973 (from English summary, p. 159).

Nezumia sp.: Parin, 1975: 321 (2 specimens from W of Galápagos). Parin, Pokhilskaya, Sazonov and Fedoryako, 1976: 225 (description; 2 specimens).

DIAGNOSIS.—This distinctive bathypelagic species of *Nezumia* is black. Each of the small, circular scales bears 1–15 long, slender, erect spinules that render the entire body surface velvety. Scale rows below the origin of the second dorsal fin number about 11–14, and there are about 50 scales in the lateral line from its origin over a space equal to the predorsal length. The outermost of the short gill-filaments are half as long as the pupil. The gill-rakers on the inner side of each of the first two gill-arches number 10–13 (usually 11–12). The outermost of the 11–12 pelvic rays is usually greatly prolonged, 1.0 to 2.5 times as long as the head. The gas-bladder is rudimentary. The weakly developed lateral line is represented by a file of small papillae.

DESCRIPTION.—*General Features:* Counts and measurements are given in Tables 4 and 5. The greatest width of the moderately compressed head is about two-thirds the greatest body depth. The bluntly pointed snout is armed with a spiny median scute and small, blunt, lateral scutes. The interorbital region is gently convex. Except in young individuals, the orbit does not quite enter the dorsal profile. The gill-membranes are broadly attached to the isthmus. The outer gill-slit is restricted. The small, tuberculear gill-rakers number 1–3 + 9–10 (total

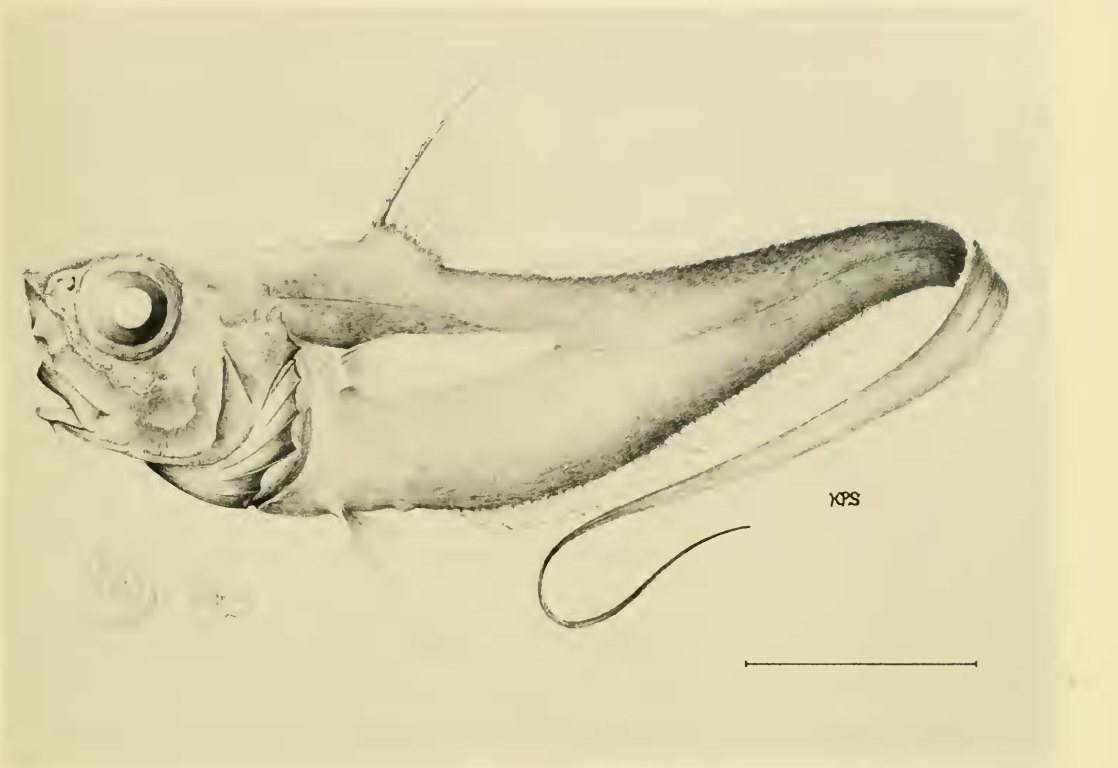

FIGURE 11. Holotype of *Nezumia parini* Hubbs and Iwamoto, SIO 73–165, 34 mm HL, 210 mm TL, from central equatorial Pacific. Enlarged dorsal and lateral views of scale from region between origin of second dorsal fin and lateral line (not drawn to scale). Scale indicates 25 mm. Drawn by Katherine P. Smith.

10–13) on the mesial side of the first arch, and 1–2 + 8–10 (total 10–12) on the second arch. The gill-filaments are much shorter than those in the most closely related benthopelagic relatives and appear to be more fragile. The anus is located within the middle third of the distance between the pelvic-fin base and the anal-fin origin. The anterior dermal window of the midventral light organ is externally evident as a small, teardrop-shaped fossa adjacent to the anus. The relatively short, thin, simple pyloric caeca branch near their attachment to the wall of the pylorus; 21–29 caeca were counted in four specimens. In a male paratype (SIO 73–165) 30 mm in head length, the deflated rudimentary gas-bladder is only 2.5 mm long. Its drumming muscles are large (about 6 mm long), but have no apparent direct connection with the gas-bladder; they originate anteriorly on the body wall and are probably inserted posteriorly to the mesentary around the gas-bladder. The lateral line is reduced to a series of small, black papillae (free neuromasts?) that follow a course, from the posttemporal region posteriad onto the trunk and tail, similar to that of the lateral line in most macrourids. The sensory pores on the head are poorly developed.

Scales: The small, almost circular scales are armed with 1–15 (more in large specimens) long, slender, erect, terminally recurved spinules, arranged in 1–4 slightly divergent rows. Almost the entire head and body are uniformly scaled except on the ventral and anterodorsal surfaces of the snout, portions of the suborbital region, the gill-membranes, and the periproct. The base of the first dorsal, pelvic, and pectoral fins, and the mandibular rami, are sparsely and loosely scaled. The margins of the mandibles are often devoid of scales.

Fins: The fins are moderately well developed, although the rays are fragile. The outer pelvic ray is prolonged into a hairlike filament. The pelvic fins lie directly below the pectorals and anterior to the dorsal (these relative fin positions are somewhat exaggerated in the holotype (Fig.

TABLE 4. SELECTED MEASUREMENTS FROM 12 TYPE-SPECIMENS OF *Nezumia parini*. TOTAL LENGTHS AND HEAD LENGTHS IN MILLIMETERS; OTHER MEASUREMENTS IN THOUSANDTHS OF HEAD LENGTH. (HOLOTYPE INDICATED BY AN ASTERISK*.)

	ZMUC P372830	SIO 72–195	USNM 215324	ZMUC P372831	SIO H52–38	SIO 72–182	SIO H52–38	CAS 15996	SIO 72–195	SIO 72–195	SIO 73–165*	CAS 29414	Range
Total length	82	+75	104	91	118	+90	154	135	168	192	210	216	+75–216
Head length	14.8	15.4	16.8	17.7	19.0	21.0	21.9	24.4	30.2	31.9	34.0	35.0	14.8–35.0
Postrostral length	857	792	774	785	774	800	799	791	775	771	765	777	765–857
Snout length	271	260	250	249	226	276	233	246	252	251	241	234	226–276
Preoral length	271	201	244	215	216	233	274	246	228	226	264	234	201–274
Orbit diameter	364	377	381	367	374	380	406	369	361	345	368	395	361–406
Interorbital width	264	253	280	260	368	276	265	270	272	282	273	257	253–368
Postorbital length	463	403	417	373	352	371	397	410	361	382	411	375	352–436
Orbit to angle preop.	379	383	375	362	347	338	365	366	334	361	344	363	334–383
Suborbital width	143	130	119	153	147	124	135	123	119	129	134	114	114–153
Upper jaw length	357	338	327	316	321	329	310	320	331	313	318	315	310–357
Preanal length	1,286	1,883	1,280	1,158	1,263	1,309	1,461	1,137	1,325	1,285	1,559	1,371	1,127–1,883
Outer 2P. ray to A.	429	390	387	282	379	430	452	328	430	361	391	334	282–452
Isthmus to A. origin	643	584	625	508	658	667	776	574	695	627	647	620	508–776
Greatest body depth	786	714	792	650	806	762	806	779	861	878	853	886	650–886
1D–2D interspace	357		256	339	253	205	338	390	563	439	270	429	205–563
Height first dorsal				791	737		959			815	~588	886	588–959
Length pectoral fin	714	714	1,042	565		571			728	690	~588	600	565–1,042
Length pelvic fin			952			714	1,598		1,589	1,473	1,294	1,143	714–1,598
Length barbel	86	78	101	102	95	129	87	82	99	69	118	103	69–129
Length 1st gill-slit	214	195	185	170	168	186	146	164	136	146	153	172	136–214

TABLE 5. RANGE, MEAN ($\bar{x}$) AND STANDARD DEVIATION (S.D.) OF SELECTED COUNTS TAKEN FROM TYPE-SPECIMENS OF *Nezumia parini* HUBBS AND IWAMOTO. ABBREVIATIONS: FIRST DORSAL FIN—1D.; PECTORAL FIN—1P.; PELVIC FIN—2P.; GILL-RAKERS ON MEDIAL SIDE OF FIRST ARCH, INCLUDING RUDIMENTS—GR I; GILL-RAKERS ON MEDIAL SIDE OF SECOND ARCH—GR II.

	N	Range	$\bar{x}$	S.D.
1D.	20	9–11	10.30	0.80
1P.*	36	13–19	16.03	1.30
2P.*	39	10–12	11.00	0.32
GR I	20	10–13	11.40	0.68
GR II	20	10–14	11.55	0.89

* Includes counts of both right and left fins from each specimen, if possible.

11) due to some dorsal flexure of the head in preservation). The anal fin originates slightly behind a vertical through the end of the first dorsal base. The first dorsal spine is small and spikelike; the second is slightly prolonged and is armed along the leading edge with a file of small sharp spinelets.

Dentition: The small teeth form narrow bands in each jaw. Those on the premaxillary are narrowly separated at the symphysis, and those of the outer series are slightly enlarged.

Coloration in Alcohol: Some specimens are almost entirely black; others grade to dark brownish black. The buccal cavity is dark gray, but the gill cavity and the gill-filaments are mostly pallid. The peritoneal membrane is a splotchy dark brown.

DISTRIBUTION.—*Nezumia parini* has been taken only in open midwater nets fished at meso- to bathypelagic depths in the eastern and equatorial central Pacific (Fig. 8). The species is found in a narrow belt along the equator, from the mid-Pacific to the coast of South America. Its distribution along the continental margin appears to stop at the Gulf of Panama in the north, and northern Chile (at about 20°S) in the south. The northern boundary of its range coincides with the southern extent of the oxygen-minimum zone off Central America (Brandhorst 1959: Fig. 4). Whether this zone is limiting to the dispersal of *N. parini*, as it is with many other midwater fishes, may seem doubtful in view of the species' abundance off Peru, where another oxygen-minimum layer is developed. Perhaps the greater thickness of the layer off Central America, where it may be more than 1200 m thick, forms an effective barrier to the northward dispersal of *N. parini*, while the less thick layer off Peru (maximum thickness about 800 m *fide* Wyrtki 1967) allows the species to reside below the oxygen depleted layer.

RELATIONSHIPS.—In its evolution *Nezumia parini* appears to have undergone considerable selection rendering it better adapted to a bathypelagic existence. These changes, however, have not obscured its basic relationship with that group of strictly benthopelagic species of *Nezumia* including *N. aequalis* (Günther) and *N. condylura* Jordan and Gilbert. Characters that indicate this relationship include: (1) the relatively sharply pointed, broad rostrum armed with a large spiny terminal and two lateral scutes; (2) the markedly angular and prominent suborbital ridge; (3) the relatively small and inferior mouth; (4) the restricted openings between the gill-arches; (5) the broadly connected gill-membranes; (6) and the relatively slender body. In varying degrees these characters contrast with those of the generally much larger species, that have in common a higher, blunter, narrower snout, a flatter suborbital region, a larger and more terminal mouth, wider openings between the gill-arches, less restricted gill-membranes, and a more laterally compressed and deeper body and head. Those contrasting species include *Nezumia atlantica* (Parr, 1946), *N. africana* (Iwamoto, 1970), *N. stelgidolepis* (Gilbert, 1891), *N. liolepis* (Gilbert, 1891), *N. holocentrus* (Gilbert and Cramer, 1897), *N. pudens* Gilbert and Thompson, 1916, and *N. bubonis* Iwamoto, 1974.

EVOLUTIONARY REMARKS.—The discovery of a bathypelagic species of *Nezumia* is remarkable, considering that its closest relations are with species that are specialized toward feeding on benthic organisms rooted from the bottom. That *Nezumia parini*, in evolutionary terms, has not been long removed from a benthopelagic habit is reflected in its retention of features prevailing in its nearest relatives: in particular, a stout bony rostrum and suborbital ridge, a mental barbel, and a protrusible, inferior mouth. *N. parini* appears to have evolved the following features in adaptation to conditions in the bathypelagic realm: (1) entirely black or blackish color; (2) rudimentary gas-bladder; (3) short and thin gill-filaments; (4) vestigial lateral line; (5) small scales and thin, erect spinules that render the surface velvety; (6) much gelatinous intermuscu-

lar tissue; and (7) weak fin rays. Most of these features are shared in common with other strictly bathypelagic macrourids, as discussed by Marshall (1964). One can readily appreciate the advantages conferred by black color (camouflage), vestigial gas-bladder, reduced gill-filaments, gelatinous tissue, and weak fin rays (related to energy conservation and a slower life style). The peculiar scales are a puzzle, however—what advantages would they give? This scale type is developed in *Odontomacrurus*, *Cynomacrurus*, *Squalogadus*, *Macrouroides*, and, to varying degrees, in *Mesobius* and *Echinomacrurus*. In contrast to the small eyes found in these other genera (excepting *Mesobius*, which has moderate-size eyes), the eyes of *N. parini* are huge, measuring a third to two fifths of the head length. Perhaps the eyes are used more for detection of predator or prey than are the organs of the lateralis system (which seem to be less developed than those of its benthic relatives, especially along the trunk and tail). Feeding habits of *N. parini* are undoubtedly quite different from those of *Odontomacrurus murrayi* and *Cynomacrurus piriei*, if the large fanglike teeth, large terminal mouth and large, open head pores of the sensory lateralis system in the last two species are any indication. Feeding habits of the new species probably more closely approach those of *Squalogadus modificatus* and *Macrouroides inflaticeps*, both of which have small, protrusible, inferior mouths that are probably adapted to feed on small pelagic invertebrates and fishes. Juvenile macrourids taken at bathypelagic depths are often crammed with bathypelagic copepods. Perhaps *N. parini* feeds on similar organisms.

ETYMOLOGY.—We take deep pleasure in naming this highly distinctive species for our esteemed Soviet colleague Nikolay V. Parin, who has also recognized it as undescribed, and has very generously made his material available to us.

MATERIAL EXAMINED.—*Holotype*. SIO 73–165 (34 mm HL, 210 mm TL): mid-equatorial Pacific, 00°01.3′–0.2′S, 155°01.1′–154°59.8′W; IKMT; oblique tow, 1500 m.w.o.; R/V GEORGE MELVILLE, cr. CATO 2, sta. 36, tow 71, 15 July 1972.

Paratypes. **Gulf of Panama:** ZMUC P372830 (1, 14.8 HL, 82 TL); 7°30′N, 79°19′W; stramin net with 150-cm opening; estimated fishing depth 0–1250 m, 2500 m.w.o., bottom depth 2550 m; DANA sta. 1203 XII, 11 Jan. 1922.—ZMUC P372831 (1, 17.7 HL, 90 TL); 6°48′N, 80°33′W; 300-cm ring-trawl; estimated fishing depth 0–1750 m, 3500 m.w.o.; DANA sta. 1208 IV, 16 Jan. 1922. **Galapagos:** PPSIO (1, 31 HL, + 164 TL); 00°17.5′S, 89°28.7′W; IKMT; 0–600–700 m; R/V AKADEMIK KURCHATOV sta. 313, sample N261, 10–11 Nov. 1968. **Ecuador:** PPSIO (1, 32 HL, 198 TL); 00°00.0′N, 85°00.0′W; IKMT; 1500–0 m; R/V AKADEMIK KURCHATOV sta. 219A, sample N25, 28 Aug. 1968. **Peru:** PPSIO (1, 18 HL, + 81 TL); 5°54.8′S, 84°53.8′W; IKMT; 0–1400 m; R/V AKADEMIK KURCHATOV sta. 227, sample N65, 5 Sept. 1968.—USNM 215325 (1, 19 HL, + 108 TL); 7°43′–33′S, 80°43′W; IKMT; 700–1110 m; R/V ANTON BRUUN cr. 18B, sta. 755, 6 Sept. 1966.—LACM 10279 (1, 18 HL, 90 TL); 7°47.5′S, 81°23′W; IKMT; 677 m; ELTANIN sta. 34, 7 June 1962.—CAS 29194 (1, 20.5 HL, 118 TL); 8°26′S, 80°26′W; IKMT; 2150–1230 m; R/V ANTON BRUUN cr. 16, sta. 650H, 9 June 1966.—CAS 15996 (3, 17–24 HL, 111–135 TL); 11°50′–52′S, 78°16′–24′W; IKMT; 0–1350 m, bottom depth 1640 m; R/V ANTON BRUUN cr. 16, sta. 656P, 16 June 1966.—SIO 65–603 (1, 33 HL, 161 TL); 11°51′–12°06′S, 79°04′–78°58.5′W; 10-ft IKMT; ca. 0–2000 m, 5630 m.w.o.; R/V ANTON BRUUN cr. 12, sta. 1, 21 Nov. 1965.—CAS 29414 (1, 35 HL, 216 TL); 11°52′–53′S, 78°24′–19′W; IKMT; 0–900 m; R/V ANTON BRUUN cr. 16, sta. 656Q, 13 June 1966.—USNM 215324 (1, 16.8 HL, 104 TL); 11°56′–55′S, 79°06′–78°53′W; IKMT; 0–455 m, bottom depth 4450 m; R/V ANTON BRUUN cr. 16, sta. 656A, 12 June 1966.—PPSIO (2, 26–37 HL, 140–221 TL); 12°20.0′S, 81°42.5′W; IKMT; 0–1500 m; R/V AKADEMIK KURCHATOV sta. 229, sample N80, 7–8 Sept. 1968.—PPSIO (1, 23 HL, + 125 TL); 12°43.9′S, 78°31.9′W; IKMT; 0–1500 m; R/V AKADEMIK KURCHATOV sta. 277, sample N198, 25 Oct. 1968.—SIO 72–195 (4, 15–32 HL, 75–192 TL); 13°51.3′S, 77°41.1′W; 10-ft IKMT; estimated fishing depth 0–1100 m, 3000 m.w.o.; R/V WASHINGTON SouthTow Exped., sta. MV72–11–38, 12–13 May 1972. **Chile:** SIO 72–182 (1, 21 HL, 90 TL); 18°38.4′–35.1′S, 70°39.0′–35.1′W; 10-ft IKMT; estimated fishing depth 0–940 m, 2500 m.w.o.; R/V WASHINGTON SouthTow Exped., sta. MV72–11–25, 6–7 May 1972.—PPSIO (1, 35 HL, 230 TL); 20°00.0′S, 76°42.0′W; IKMT; 0–1500 m; R/V AKADEMIK KURCHATOV sta. 236, sample N112, 17 Sept. 1968. **Equatorial Pacific:** PPSIO (1, 16 HL, + 104 TL); 00°01.4′S, 97°02.7′W; IKMT; 0–700 m; R/V AKADEMIK KURCHATOV sta. 1454, sample N98, 18 Jan 1974.—PPSIO (1, 14 HL, + 70 TL); 00°01.4′S, 97°02.7′W; IKMT; 0–410–420 m; R/V AKADEMIK KURCHATOV sta. 1454, sample N112, 19 Jan. 1974.—SIO 69–496 (1, 29 HL, 142 TL); 02°20′–12′S, 100°42.5′–27′W; 10-ft IKMT; 0–675 m, 1800 m.w.o., bottom depth 3292 m; R/V WASHINGTON sta. QBR–16–MWT, 26 Nov. 1969.—SIO H52–38 (2, 19–22 HL, 118–154 TL); 00°17.7′N, 110°26′W; 7 June 1952.—PPSIO (1, 38 HL, 245 TL); 01°59′N, 125°19′W; IKMT; 0–900–1000 m; R/V LIRA trawl 51, 27 Mar. 1966.—SIO 73–171 (1, 36 HL, 228 TL); 00°07.0′–06.6′S, 154°56.0′–155°01.4′W; IKMT; oblique tow, 3000 m.w.o.; R/V MELVILLE cr. CATO 2, sta. 36, tow 83, 17 July 1972.—SIO 73–165 (1, about 30 HL, 185 TL); data same as for holotype.

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